Appendix C

Planning Steps for DQO Development and

Mare Island Naval Shipyard Example

Example of Data Quality Objectives

Developed for Mare Island Naval Shipyard

Phase II Remedial Investigation, On-Site Laboratory Data Quality

As defined by the EPA in the guidance document, “Data Quality Objectives Process for Superfund” (EPA, 1993), the goal of the DQO process is to collect data of appropriate quality for environmental decisionmaking while minimizing expenditures related to data collection by eliminating unnecessary duplication or overly precise data and, at the same time, to collect data of sufficient quantity and quality to support defensible decision making. As stated in the EPA guidance:

It is important not to rule out any alternative analytical or field sampling methods due to preconceptions about whether or not the method is “good enough.” It must be remembered that the objectives of the statistical design are to limit the total error, which is a combination of sampling and measurement error, to acceptable levels. Traditional laboratory methods tend to minimize measurement error, but they can be so expensive that only a limited number of samples can be analyzed within the budget. There often may be advantages to using less precise methods that are relatively inexpensive, thereby allowing a significantly larger number of samples to be taken. Such a design would trade off an increase in measurement error for a decrease in sampling error. Given the large amounts of natural variability in many environmental studies, this approach may reduce overall costs while limiting the total decision error rates to acceptable levels just as well as a design based on traditional laboratory methods.

The DQO process that resulted in the decision to use an on-site laboratory is summarized as follows:

State the problem: The Phase I RI and other previous investigations lacked sufficient information on the extent of identified COPCs in soil. The Phase II RI FSAP summarized these previous investigations and stated the maximum concentrations of the identified soil and groundwater COPCs. For most IR sites, the associated data gaps were concerned with defining vertical and lateral extent and assessing migration pathways.

Identify the decision: For the Phase II RI, it was decided that the goal would be to acceptably define the vertical and lateral extent and additional migration pathways of previously identified COPCs in soil. Most of the 23 IR sites had been previously investigated in the Phase I RI, and some of these sites were part of as many as four other investigations. The Phase II RI should be the last investigative work done at these sites.

Identify the inputs to the decision: The FSAP called for initial sampling locations which would be supplemented with additional locations (or “step-outs”) to further delineate the limits of COPCs. Certain preliminary remedial goals (PRG) were used as a management tool to evaluate whether or not additional locations were necessary; specifically, the EPA Region IX PRGs for residential soil use were used for this purpose. Because the PRGs for calcium, cobalt, iron, and potassium were not found to be useful in the step-out decision-making, they were not used for this purpose. For the petroleum decision-making, the best available information from other Navy installations was used; the petroleum “step-out” values were based upon the alternate petroleum cleanup levels negotiated by the Navy at Moffett Federal Airfield. The PRGs and step-out values were only used as a management tool in deciding where additional sample locations might be needed. For each IR site, the RI report will present the results of the previous and present data collection efforts and show that the nature and extent has been sufficiently evaluated or that the site is adequately characterized.

Define the study boundaries: Soil samples taken to primarily to verify the extent of previously identified COPCs (specifically, petroleum, PCBs, and metals) would be analyzed at an on-site laboratory; approximately 15 percent of these samples would also be sent to an off-site, California-certified laboratory. It was assumed that the on-site laboratory data would supply reliable data with regard to delineating the “detected extent” of the COPCs and reasonably expected that the on-site data could provide reliable data for the “nondetected extent” of the COPCs.

Develop a decision rule: If the on-site and off-site laboratory data showed consistent evaluation of COPC extent based upon the PRG/step-out management tools, the on-site laboratory data would be considered definitive data for nature of extent. If the on-site and off-site laboratory data showed a consistent numerical relationship for the COPCs, the on-site laboratory data would be considered definitive data for the purposes of ambient concentration determination and risk assessment.

Specify limits on decision errors: The tolerance for errors would be least when the chemical data erroneously indicate that the site is “clean.” This type of false negative error should be less than 5 percent and approach 0 percent for each analyte. The tolerance for errors would be somewhat more when the chemical data erroneously indicate that the site is “contaminated.” This type of false positive error should be less than 10 percent for each analyte.

Optimize the design for obtaining data: A technical memorandum would be written evaluating the quality of the on-site laboratory data and making general and specific recommendations for the proposed uses of the data.

For more detailed descriptions of the DQO process, refer to: (1) USEPA’s “Guidance for the Data Quality Objectives Process”, EPA QA/G-4, September 1994; and (2) USEPA’s “Data Quality Objectives Process for Superfund, Interim Final”, EPA/540/G-93/071, September 1993.

It should be understood that the stakeholders must be involved in planning to ensure that project data needs are met. Stakeholders may include RPMs, decision makers/managers, hydrogeologists, ground water modelers, engineers, chemists, toxicologists, statisticians, etc., responsible for aspects of site restoration.

Appendix D

Explanation of Acronyms/Terms

AL	Action level
Aroclor	Proprietary mixtures of polychlorinated biphenyl compounds (PCBs)
Batch	Herein, means the set of samples analyzed by the same staff in one day
Blank	A clean sample used to monitor contamination during handling
BTEX	Benzene, toluene, ethylene and xylene
Cal/EPA	California Environmental Protection Agency
CBCEC	California Base Closure Environmental Committee
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act as amended by the Superfund Amendments and Reauthorization Act
CERFA	Community Environmental Response Facilitation Act (amended CERCLA)
CLP	USEPA's Contract Laboratory Program
CMECC	California Military Environmental Coordination Committee
CoCs	Constituents of concern
AA	Atomic absorption
Confirmation	Analysis by modified or independent technique
CSM	Conceptual Site Model
DL	Detection limits
DoD	U.S. Department of Defense
DQOs	Data quality objectives
FS	Feasibility Study
FUDS	Formerly used defense site
GC-ECD	Gas chromatography - electron capture detector
GC-FID	Gas chromatography - flame ionization detector

GC-HSD	Gas chromatography - halide specific detector
GC/MS	Gas chromatography/mass spectrometry
ICP-AES	Inductively coupled plasma - atomic emission spectroscopy
ICP-MS	Inductively coupled plasma - mass spectrometry
Indicator	A parameter that correlates with a laboratory CoC analysis
LOD	Limit of detection
LLNL	Lawrence Livermore National Laboratory
LUFT	Leaking Underground Fuel Tank
NPL	National Priorities List
NFA	No Further Action
PA	Preliminary Assessment
PAHs	Polynuclear aromatic hydrocarbons
PAT	Chemical Data Quality/Cost Reduction Process Action Team
PCBs	Polychlorinated biphenyls
PE	Performance evaluation
pH	Hydrogen ion concentration (measures basic or acidic)
POC	Point of contact
Ppm	Parts per million
PRGs	Preliminary remediation goals
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act

(Appendix D Continued)

RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial project manager
RWQCB	California Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SCAPS-LIF	Site Characterization and Analysis Penetrometer System - Laser Induced Fluorescence
SI	Site Investigation
SITE	USEPA's Superfund Innovative Technology Evaluation Program
TPH	Total petroleum hydrocarbons
TNT/RDX	Trinitratoluene/Hexahydro - 1, 3, 5 - 1, 3, 5 - Triazine
USEPA	U.S. Environmental Protection Agency
UST	Underground storage tank
VOCs	Volatile ogranic compounds
XRF	X-Ray fluorescence

Appendix E

Field Measurement Application Guidance Questionnaire

To improve this document, user feedback is needed. Please complete this Questionnaire and send to:

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1. Is this guidance useful? Do you have suggestions on how to make it more useful?

2. Are there important matters not addressed that should be addressed; if so, what are they?

3. Based on your experience, what field measurement technologies are effective/not effective?

4. Are there additional effective field measurement technologies that should be included in the matrix; if so, what are they?

5. Are there other technical comments regarding matrix technologies that should be stated?

6. Please identify any examples of projects at which cost and time savings were achieved by applying field measurement technologies.

7. Are you interested in taking training on the use of field measurement technologies?